BTEC Inc.

Candlestick (Open) Flare
Emission Test Summary Report

Prepared for:

Cornerstone Environmental

Evergreen Recycle and Disposal Facility
2625 East Broadway
Northwood, Ohio 43619

Project No. 07-3600.00
July 9, 2007

BT Environmental Consulting, Inc.
2615 Wolcott Street
Ferndale, Michigan 48220
(248) 548-8070

BTEC Inc.

Executive Summary

BT Environmental Consulting, Inc. (BTEC) was retained by Cornerstone Environmental Group, LLC (Cornerstone) to conduct a compliance test program for one candlestick (open) flare at a landfill located in Northwood, Ohio. The purpose of the test program was to provide data too Cornerstone for use in demonstrating compliance with the requirements outlined in Title 40, Part 60, Subpart WWW of the Code of Federal Regulations (40 CFR 60, Subpart WWW).

The fieldwork, conducted May 31, 2007, was performed in accordance with BTEC's proposal, 071852B, dated April 17, 2007. Mr. Mark Westerberg, Senior Project Manager; and Mr. Brandon Chase, Environmental Engineer, conducted the testing. Mr. Matt Boudreau, with Cornerstone, provided the on-site coordination for the testing. Ms. Wendy Licht, with the Ohio Environmental Protection Agency, was onsite to observe the testing. The results of the emissions testing are highlighted below:

Parameter	Applicable Requirement	Average Result
Flare Exhaust Gas Exit Velocity (feet/second)	**<60**	**31.6**
Flare Exhaust Smoke Emissions (Visual Emissions in a 2-hour period)	**None**	**None**
Flare Inlet Gas Heating Value (MJ/scm)	**>7.45**	**17.55**

MJ: megajoules
scm: standard cubic meters

BTEC Inc.

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BTEC Inc.

1.0 Introduction

BT Environmental Consulting, Inc. (BTEC) was retained by Cornerstone Environmental Group, LLC (Cornerstone) to conduct a compliance test program for one candlestick (open) flare at the Evergreen Recycling & Disposal facility (RDF) landfill located in Northwood, Ohio. The purpose of the test program was to provide data to Cornerstone for use in demonstrating compliance with the requirements outlined in Title 40, Part 60, Subpart WWW of the Code of Federal Regulations (40 CFR 60, Subpart WWW).

Field sampling for the emissions test program was conducted on May 31, 2007. Mr. Mark Westerberg, Senior Project Manager; and Mr. Brandon Chase, Environmental Engineer, conducted the testing. Mr. Matt Boudreau, with Cornerstone, provided the on-site coordination for the testing. Ms. Wendy Licht, with the Ohio Environmental Protection Agency, was onsite to observe the testing.

2.0 Process Description

The Evergreen Recycling & Disposal Facility (RDF) employs a candlestick (open) flare to burn landfill gas extracted by a network of extraction wells (see Figure 1 for a schematic of the flare). The flare is rated at 4,300 scfm.

3.0 Sampling and Analytical Methodologies

Sampling and analytical methodologies for the emissions test program can be separated into two categories as follows:

(1) Measurement of exhaust gas velocity, and molecular weight;
(2) Measurement of Fugitive Emissions

Descriptions of sampling and analytical methodologies by category are summarized by Sections 3.1 and 3.2, respectively.

3.1 Exhaust Gas Velocity, Molecular Weight, and Moisture Content

Measurement of exhaust gas velocity, molecular weight, and moisture content was conducted using the following reference test methods codified at Title 40, Part 60, Appendix A of the Code of Federal Regulations (40 CFR 60, Appendix A):

- Method 1 - *"Location of the Sampling Site and Sampling Points"*
- Method 2 - *"Determination of Stack Gas Velocity and Volumetric Flowrate"*
- Method 3C - *"Determination of carbon dioxide, methane, nitrogen, and oxygen from stationary sources"*

Note: Stack gas velocities were provided by the facility utilizing the facilities flow continuous emissions monitoring system (cems). Production data including flare inlet flowrate, and landfill gas feed rate are provided in Appendix A. Stack gas velocity traverses could not be conducted

by BTEC in accordance with the procedures outlined in Method 1 and Method 2 due to the absence a of sampling port 90-degrees from the sampling port on the horizontal axis of the duct. However, as a check of the facilities flow cems a traverse was conducted on the horizontal sampling port utilizing a standard pitot tube and thermocouple assembly, calibrated in accordance with Method 2, Section 4.1.1, to measure exhaust gas velocity pressures (using an incline manometer and pyrometer) during testing (see Appendix C for results). The standard pitot tube dimensions were within specified limits, therefore, a baseline pitot tube coefficient of 0.99 (dimensionless) was assigned.

The flare inlet gas molecular weight and heating value was evaluated using USEPA Method 3C, "Determination of Carbon Dioxide, Methane, Nitrogen, and Oxygen from Stationary Sources". Three 30-minute integrated samples were extracted from the flare inlet gas stream using a stainless steel probe and an evacuated cylinder (see Figure 2 for a schematic of the sampling train). Triangle Environmental Services (TES) analyzed the samples utilizing a gas chromatograph equipped with a thermal conductivity detector. Molecular weight was calculated using the method outlined in Section 12.0 of USEPA Method 3. Heating value was calculated according to the method detailed in Title 40 of the Code of Federal Regulations, Part 60.18. The laboratory analytical data pertaining to the USEPA Method 3C analysis are available in Appendix B. Moisture content of the gas stream was determined by USEPA Method 3C analysis. The field data sheets relating to these analyses can be viewed in Appendix C.

3.2 Flare Exhaust Smoke Emissions (USEPA Method 22)

Visual Emissions from the operation of the flare were evaluated according to USEPA Method 22, "Visual Determination of Fugitive Emissions from Material Sources and Smoke Emissions from Flares". The frequency and length of time that visible emissions were observed was recorded during the course of one 2-hour observation period. Field data relating to this test method are available in Appendix D.

4.0 Test Results

The performance requirements of 40 CFR 60.18 with respect to an open non-assisted flare for which compliance must be demonstrated by this testing are (1) the exhaust gas exit velocity must be less than 60 feet per second (fps), and (2) the net heating value of the gas stream being combusted in the flare must be greater than 7.45 megajoules per standard cubic meter (MJ/scm). The average values of exit velocity and net heating value indicated by this testing were 31.6 fps, and 17.55 MJ/scm, respectively. The tested flare exhaust stack is therefore in compliance with 40 CFR 60.18. Raw field and computer-calculated data used in the determination of the flare exit velocity, laboratory analytical utilized to calculate net heating values, as well as all equipment calibration, and flare operational data are available in the appendices. Sample calculations are presented in Appendix E.

BTEC Inc.

Limitations

The information and opinions rendered in this report are exclusively for use by Cornerstone. BTEC will not distribute or publish this report without Cornerstone's consent except as required by law or court order. BTEC accepts responsibility for the competent performance of its duties in executing the assignment and preparing reports in accordance with the normal standards of the profession, but disclaims any responsibility for consequential damages.

This report was prepared by: Brandon Chase

Brandon Chase
Staff Environmental Engineer

This report was reviewed by: Mark D Westerberg

Mark D. Westerberg
Senior Project Manager

Table 1
Flare Inlet Gas Stream Volumetric Flowrate and Exit Velocity
Evergreen Recycling and Disposal Facility
Northwood, OH
BTEC Project No. 07-3600.00
May 31, 2007

Parameter	Test 1	Test 2	Test 3	Average
Sample Time	10:16	10:48	11:20	
Flare Inlet Gas Volumetric Flowrate (scfm)	2,009	1,983	2,093	2,028
Flare Tip Diameter (in.)	14.0	14.0	14.0	
Flare Tip Cross-Sectional Area (ft^2)	1.07	1.07	1.07	
Allowable V_{max} (fps)[1]	**60**	**60**	**60**	**60**
Flare Gas Exit Velocity (fps)	**31.3**	**30.9**	**32.6**	**31.6**

[1] from 40 CFR 60.18(c)(4)(i)
scfm standard cubic feet per minute
in. : inchs
fps : feet per second

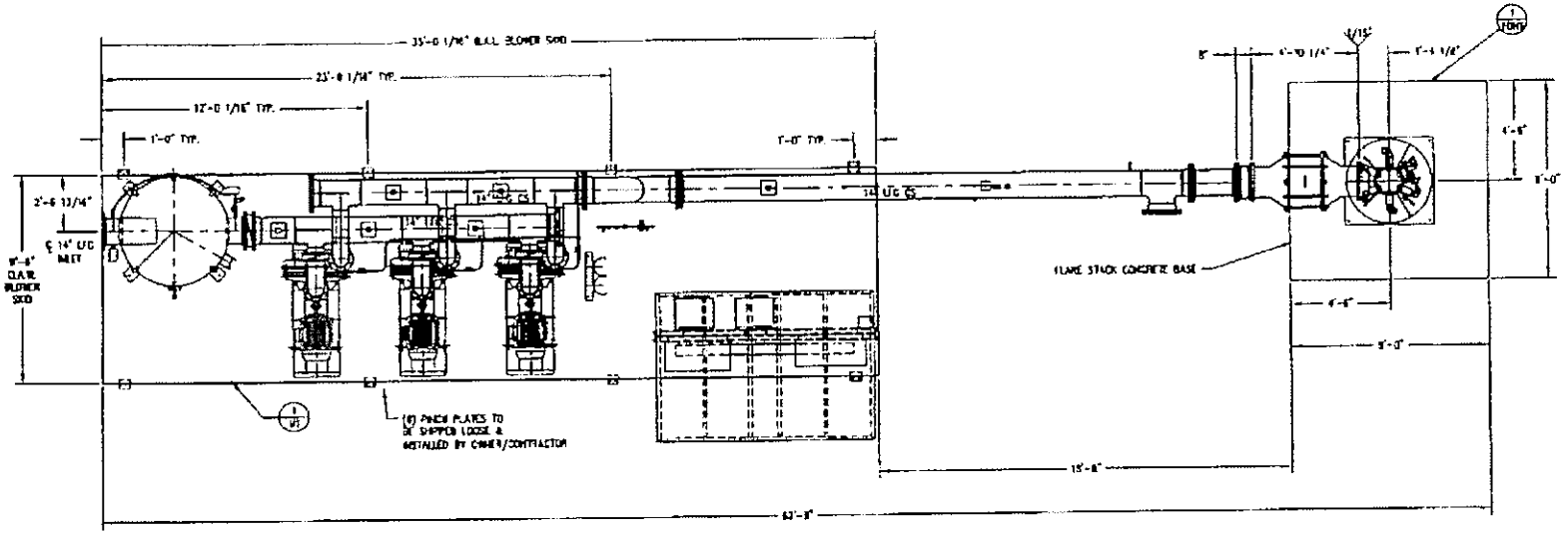
Table 2
Flare Inlet Gas Net Heating Value
Evergreen Recycling and Disposal Facility
Northwood, Ohio
BTEC Project No. 07-3600.00
May 31, 2007

Parameter	Test 1	Test 2	Test 3	Average
Flare Inlet Gas Methane Content (ppm)	558,380	555,759	468,223	527,454
Flare Inlet Gas Methane Content (%)	55.8	55.6	46.8	52.7
Methane Molecular Weight (lb/lb mol)	16	16	16	
Methane Heating Value (kcal/g)[1]	11.9533	11.9533	11.9533	
Methane Heating Value (kcal/g mol)	191.3	191.3	191.3	
Flare Inlet Gas Minimum Net Heating Value Requirment (MJ/scm)[2]	**7.45**	**7.45**	**7.45**	**7.45**
Flare Inlet Gas Net Heating Value (MJ/scm)	**18.58**	**18.49**	**15.58**	**17.55**

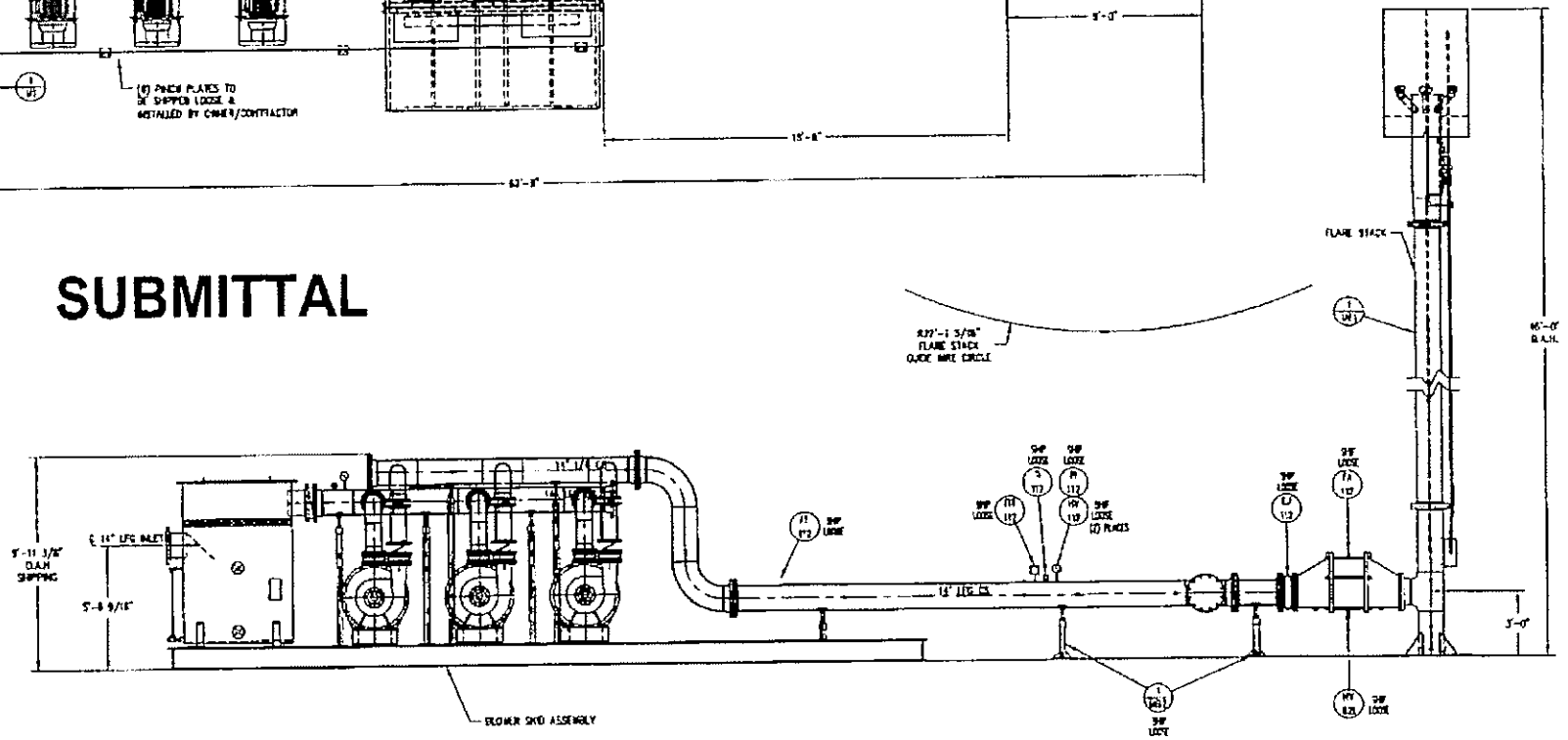
[1] USEPA Office of Air Quality Planning and Standards' Control Cost Manual

[2] from 40 CFR 60.18(c)(3)(ii)

ppm : parts per million volume
kcal/g : kilocalories per gram
kcal/g mol : kilocalories per gram mole
MJ/scm : megajoules per standard cubic meter



SUBMITTAL



Shaw LFG Specialties, LLC

1	UPDATED PER CUSTOMER REVIEW FOR APPROVAL	3/28/08	CDH
0	RELEASED FOR APPROVAL	3/27/08	CDH
REV	DESCRIPTION / ISSUE	DATE	BY

GENERAL ARRANGEMENT

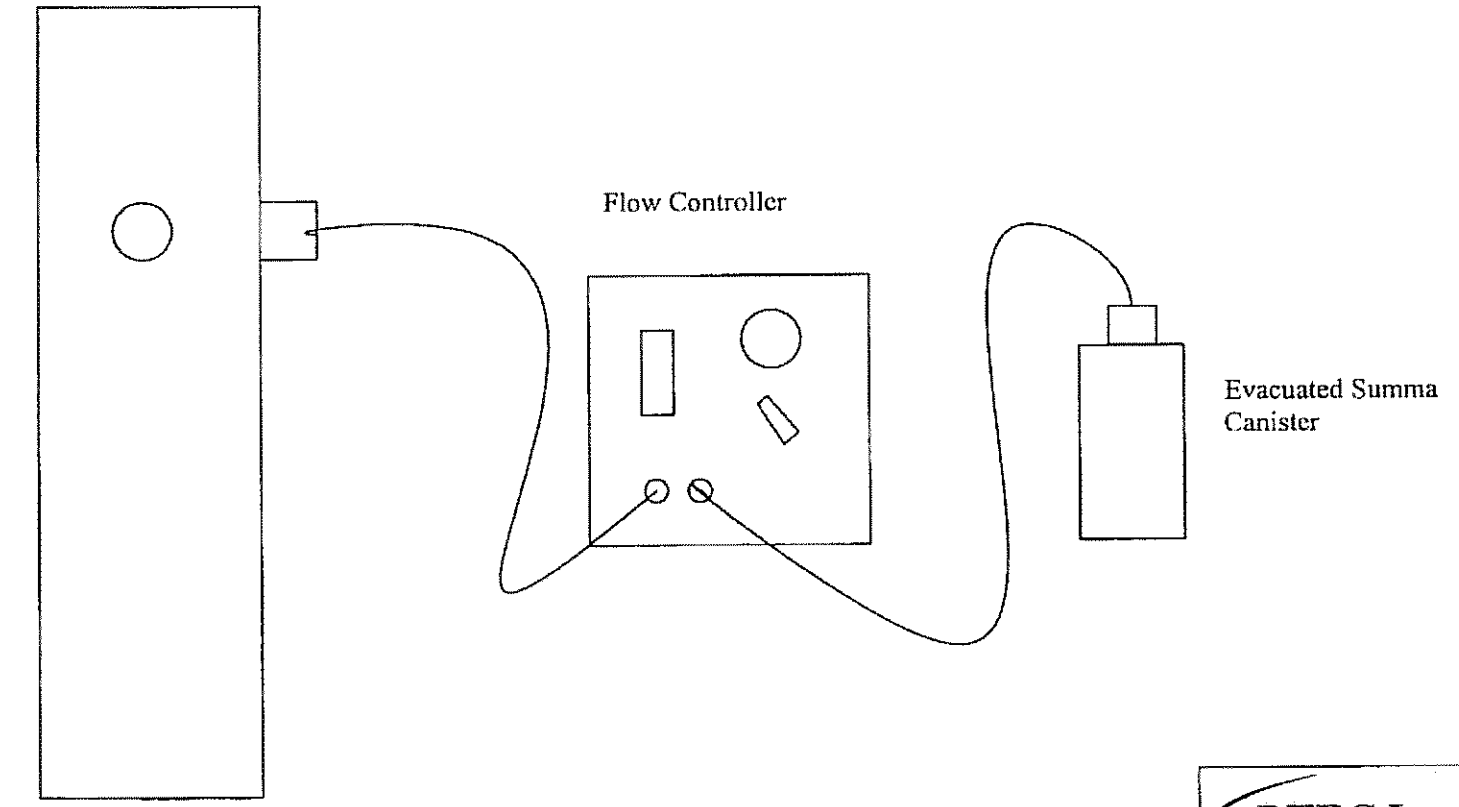
DRAWN BY CDH	DESIGNED BY PE	APPROVED BY PE	REV 0
SCALE 3/8"=1'-0"	DATE 3/18/08	PROJECT NO 12137A	

LANDFILL GAS UTILITY FLARE (QCFT1442)14
OVERMEER LANDFILL
TOLEDO OH

WASTE MANAGEMENT | 30251 | GA1 | 1

File: F:\LFG\2008 DRAWINGS\2030\MECHANICAL\2030-GA1.dwg Layout: Model User: KenMinson Jun 13, 2008 - 3:31pm

USEPA Method 3C



BTEC Inc.	B.T. Environmental Consulting Inc. 2615 Wolcott Street Ferndale, Michigan 48220 (248) 548 - 8070
Project No. 07-3600.00	
Client Cornerstone Evergreen Northwood, OH	Source Flare
Date 6-29-07	Scale Not to Scale / Figure No. 2

DAQSTANDARD	R6.03	
Data Viewer	R6.03	
WASTE MANAGEMENT INC	WMI-User	115-00009-****

Device Type	FX100	
Serial No.	S5DA05308	
File Message		
Time Correction	None	
Starting Condition	Auto	
Dividing Condition	Auto	
Meas Ch.	3	
Math Ch.	2	
Data Count	96	
Sampling Interval	600.000 sec	
Start Time	2007/05/31 11:00:00	0.000
Stop Time	2007/06/01 02:50:00	0.000
Trigger Time	2007/05/31 14:50:00	0.000
Trigger No.	23	
Damage Check	Not Damaged	

Converted Group 1 - 1

Date	Time	Ch. Tag sec	CH01 FLARE TEMP F	CH02 FLOW SCFM	CH03 VACUUM INCHES	CH31 TOTAL FLOW *100 SCF
2007/05/31	09:50:00	0.000	1425	472	-8.0	4178484
2007/05/31	10:00:00	0.000	[illegible]	2021	-28.5	4178670
2007/05/31	10:10:00	0.000	[illegible]	1999	-29.3	4178872
2007/05/31	10:20:00	0.000	[illegible]	1994	-29.1	4179071
2007/05/31	10:30:00	0.000	[illegible]	2002	-28.8	4179271
2007/05/31	10:40:00	0.000	[illegible]	2028	-28.4	4179469
2007/05/31	10:50:00	0.000	[illegible]	1973	-29.1	4179668
2007/05/31	11:00:00	0.000	[illegible]	1977	-28.8	4179866
2007/05/31	11:10:00	0.000	[illegible]	1963	-29.0	4180063
2007/05/31	11:20:00	0.000	[illegible]	1964	-28.4	4180256
2007/05/31	11:30:00	0.000	[illegible]	1987	-29.5	4180467
2007/05/31	11:40:00	0.000	[illegible]	2191	-28.8	4180687
2007/05/31	11:50:00	0.000	[illegible]	2202	-27.6	4180909
2007/05/31	12:00:00	0.000	[illegible]	1991	-28.6	4181113
2007/05/31	12:10:00	0.000	[illegible]	1988	-28.6	4181311
2007/05/31	12:20:00	0.000	[illegible]	1946	-27.6	4181506
2007/05/31	12:30:00	0.000	[illegible]	1906	-28.1	4181701
2007/05/31	12:40:00	0.000	[illegible]	1959	-28.0	4181896
2007/05/31	12:50:00	0.000	[illegible]	1934	-27.2	4182089

Test	Time	Ave Flow scfm
Run-1	10:00-10:40	2009
Run-2	10:40-11:30	1982
Run-3	11:30-12:00	2093

Method 3-C
Analytical Results

prepared for

BT ENVIRONMENTAL

2615 Wolcott
Ferndale, MI 48220

by

Triangle Environmental Services, Inc.

We, the undersigned, certify to the best of our knowledge that all analytical data presented in this report have been checked for completeness; that the results are accurate, error-free, legible, and have been obtained in accordance with approved protocol; and that all deviations and analytical problems are summarized in the "Comments on the Analyses" page(s).

Reviewed by:

Donna Nolen-Weathington
Method 25 Supervisor

Approved by:

Wayne A. Stollings
President

Approved by:

John Y. Morimoto
QA Officer

Report
07140-25C

June 12, 2007

P.O. Box 13294 Research Triangle Park, NC 27709 (800) 367-4862

SCAQMD #94 LA 0401
NJ NELAP ID - NC004
PADEP Registration #68-3321

Triangle Environmental Services, Inc.
COMMENTS ON THE ANALYSES

Report #07140-25C for BT Environmental
Project ID: Cornerstone 07-3600.00

Tanks Received: 6/1/07

Samples Analyzed: 6/4/07
Client Chain-of-Custody forms: 1 p

All samples: Laboratory preshipment and receipt pressure and temperature readings were used for the tank pre- and post-test tank data, respectively. Also, laboratory receipt barometric pressure and temperature data were used to determine the water vapor fraction.

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 3-C TABLE OF RESULTS

Name: BT Environmental ID#07140-25C Analyzed: 6/4/07

Project ID: Cornerstone 07-3600.00

	Sample Description	Concentrations (ppm) O2	N2	CH4	CO2
1	Flare Inlet Run 1	11482	57009	558380	381077
2	Flare Inlet Run 2	11704	57907	555759	379565
3	Flare Inlet Run 3	43712	171329	468223	320690

Triangle Environmental Services, Inc.
METHOD 3-C PROCEDURES

Report #07140-25C

CALIBRATION

Triplicate injections of a calibration gas mixture consisting of oxygen (≈2.5%), nitrogen (≈10%), carbon dioxide (≈25%), and methane (≈2%) are made immediately before and after each batch of samples. Daily response factors are calculated from the pre-batch integrated responses (average area count / concentration in ppm) and must agree within 20% of the response factors of the initial calibrations. Further, the post-batch response factors must agree within 5% of the pre-batch response factors. Both criteria must be met before the analyses are considered valid.

ANALYSIS

All samples, which include the daily calibration gas mixture and sample tanks, are analyzed in triplicate using a computer-interfaced gas chromatograph equipped with an automated gas sampling system and a thermal conductivity detector (TCD). O_2, N_2, CO, CH_4, and CO_2 are eluted from the column and pass to the TCD.

CALCULATIONS

Calculations are done in accord with USEPA Method 3-C procedures. A sample calculation for one of the samples is provided in the report.

EQUIPMENT

Tanks are at a minimum twice evacuated and filled with ambient air filtered through charcoal and are then evacuated to below 10 mm Hg and monitored for at least an hour to check that the tanks do not leak more than 1 mm Hg/hour. They are then pressurized to greater than ambient pressure with helium, analyzed to ensure < 2 ppm CH_4 and < 20 ppm CO_2, and stored for later use.

Certifications:

South Coast Air Quality Management District: ID# 94 LA 0401
New Jersey NELAP ID: NC004
Pennsylvania DEP: Registration #68-3321

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 3-C SAMPLE CALCULATION

Note: All pressure values have been converted when necessary to mm Hg and all temperature values to Kelvin.

Name: BT Environmental ID#07140-25C Analyzed: 6/4/07
Project ID: Cornerstone 07-3600.00

Sample # 1 Flare Inlet Run 1

D A T A

Tank N419:
Volume (cu.m) = 0.004477

	Pressure (mm Hg)	Temp.(K)
Presampling	325.0	297.15
Postsampling	585.0	301.15
Final	1988.0	301.15
Barometric	748.0	
Water Vapor	28.3	

Calibration Data:

	O2	N2	CH4	CO2
Response Factor (area units/ppmC)	28.72	31.37	25.77	36.99

Areas:

O2	40,777	40,920	40,697
N2	220,944	221,700	221,125
CH4	1,780,501	1,780,736	1,779,515
CO2	1,742,793	1,744,494	1,744,560

C A L C U L A T I O N S

Measured Concentrations (ppmC):

Cm(O2) = Area(O2) / RF(O2)
= 40777 / 28.7 = 1419.8
= 40920 / 28.7 = 1424.8
= 40697 / 28.7 = 1417.0

Cm(N2) = Area(N2)/RF(N2)
= 220944 / 31.4 = 7043.2
= 221700 / 31.4 = 7067.3
= 221125 / 31.4 = 7048.9

Cm(CH4) = Area(CH4)/RF(CH4)
= 1780501 / 25.8 = 69092.0
= 1780736 / 25.8 = 69101.1
= 1779515 / 25.8 = 69053.7

Cm(CO2) = Area(CO2)/RF(CO2)
= 1742793 / 37.0 = 47115.2
= 1744494 / 37.0 = 47161.2
= 1744560 / 37.0 = 47163.0

TRIANGLE ENVIRONMENTAL SERVICES, INC. ID#07140-25C
METHOD 3-C SAMPLE CALCULATION

Pressure-Temperature Ratio, Q(i) = P(i)/T(i):

postsampling tank: Q(1) = 585 / 301.15 = 1.942554
presampling tank: Q(2) = 325 / 297.15 = 1.093724
final tank: Q(3) = 1988 / 301.15 = 6.601362

Volume Sampled (dscm) = 0.3857 x Tank Volume x [Q(1)-Q(2)]
= 0.3857 x .004477 x [1.9426 - 1.0937]
= 0.001466

Averages and % Relative Standard Deviations (%RSD) of Cm's are calculated.
(%RSD of C = %RSD of Cm)

Moisture Correction Factor, MCF:

= 1 - Water Vapor Pressure/Barometric Pressure
= 1 - 28.3/ 748.0 = 0.9622

Calculated Concentrations (ppm):

C(O2) = Q(3)/[Q(1)-Q(2)] x Cm(O2)/MCF
= 6.6014/(1.9426 - 1.0937) x 1420.5/0.9622 = 11482.0

C(N2) = Q(3)/[Q(1)-Q(2)] x Cm(N2)/MCF
= 6.6014/(1.9426 - 1.0937) x 7053.1/0.9622 = 57009.1

C(CH4) = Q(3)/[Q(1)-Q(2)] x Cm(CH4)/MCF
= 6.6014/(1.9426 - 1.0937) x 69082.3/0.9622 = 558379.8

C(CO2) = Q(3)/[Q(1)-Q(2)] x Cm(CO2)/MCF
= 6.6014/(1.9426 - 1.0937) x 47146.5/0.9622 = 381076.7

Triangle Environmental Services, Inc.
METHOD 3-C SAMPLE QA/QC DATA

Report #07140-25C

DAILY ANALYZER CHECKS

Daily Calibration

Response Factor (RF) Checks

Requirement: Daily RF = Initial RF ± 20%

Triplicate injections of a mixture of O_2, N_2, CH_4, and CO_2 are made before and after each batch of samples.

Initial Calibration/Linearity

Triplicate injections of a calibration gas is made for each compound at three levels:

	Nominal Concentrations (ppm)			Initial RF 2/5/98
O_2	500	10,000	200,000	28.94
N_2	500	50,000	700,000	34.69
CH_4	500	50,000	500,000	28.91
CO_2	500	50,000	200,000	41.14

Analyzer Linearity Check 2/5/98

	$100x(1-RF/RF_{average})$	Requirement:
max. dev. O_2:	- 3.4%	± 10%
max. dev. N_2:	+ 1.5%	± 10%
max. dev. CH_4:	- 1.7%	± 10%
max. dev. CO_2:	+ 0.6%	± 10%

EQUIPMENT CHECKS

Clean Sampling Equipment Check

Tank	< 2 ppm CH_4	@ 100%
	<20 ppm CO_2	@ 100%

Sample Tank Evacuation and Leak Check

Tank evacuated to ≤ 10 mm Hg absolute pressure, monitored for ≥ 1 hour, and passed for use if no pressure change (< 1 mm Hg/hr) is noted.

Sample Tank Volumes

Tank weighed empty, filled with deionized distilled water (temperature recorded), and weighed to the nearest 2 g. Volume calculated based on density of water at that temperature and results recorded in permanent file.

Triangle Environmental Services, Inc.
CALIBRATION DATA FOR THE ANALYSES

Client: BT Environmental ID#07140-25C

Project ID: Cornerstone 07-3600.00

4-JUN-7 3: Analyzer F

Preanalysis Calibration

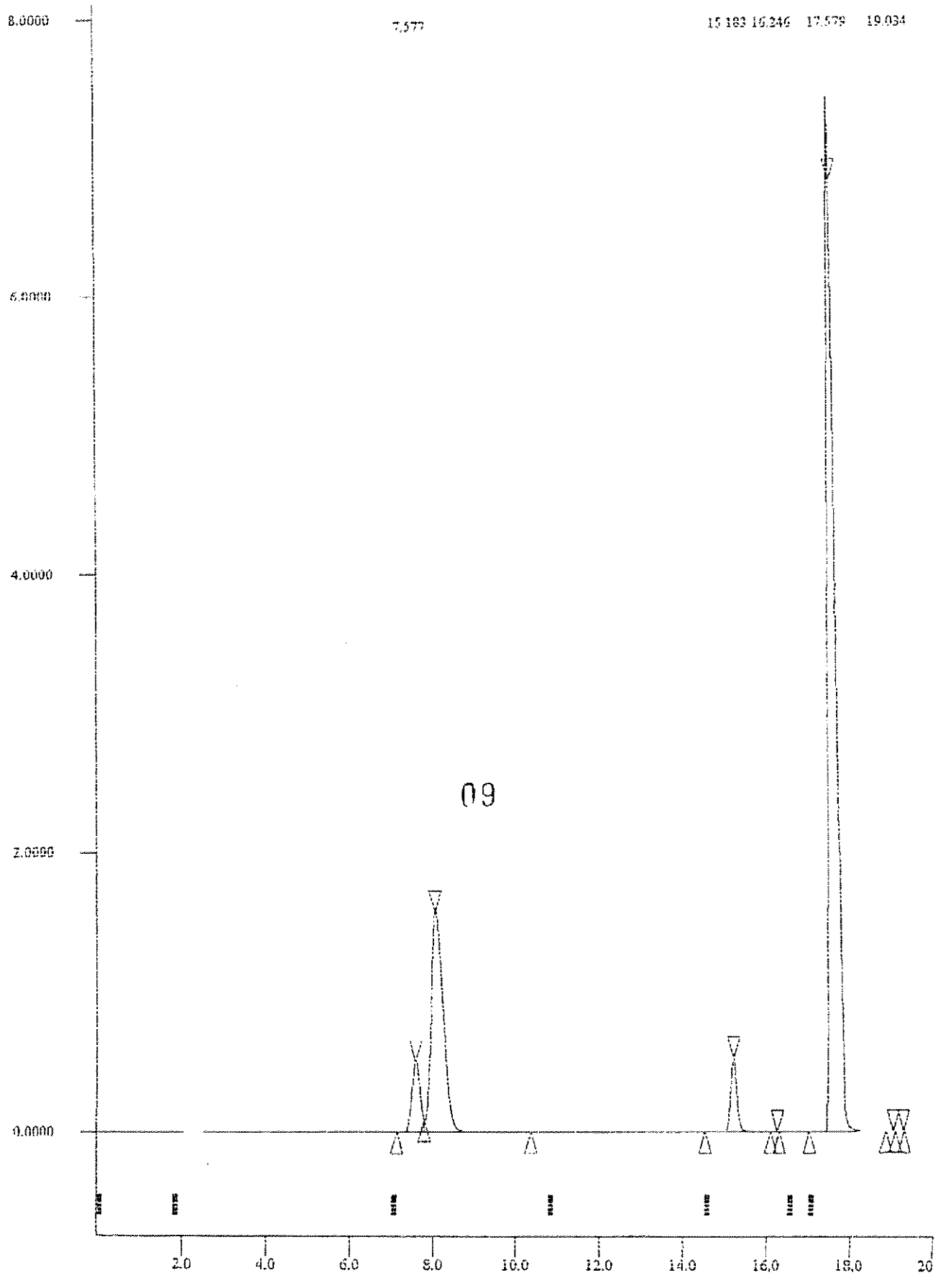
Compound	Conc.	Area(1)	Area(2)	Area(3)	Average	%RSD	RF	IRF	%Diff.
O2	24600.0	708287	704110	707485	706627	0.3%	28.72	28.94	-0.74%
N2	99500.0	3126903	3110384	3126004	3121097	0.3%	31.37	34.69	-9.58%
CH4	20500.0	529583	526818	528607	528336	0.3%	25.77	28.91	-10.85%
CO2	243000.0	9006391	8960737	9001844	8989657	0.3%	36.99	41.14	-10.08%

Postanalysis Calibration

Compound	Conc.	Area(1)	Area(2)	Area(3)	Average	RF(post)	RF(pre)	%Diff
O2	24600	704807	704479	705472	704919	28.66	28.72	-0.2%
N2	99500	3111840	3112086	3117662	3113863	31.30	31.37	-0.2%
CH4	20500	528770	527182	526224	527392	25.73	25.77	-0.2%
CO2	243000	8977658	8984236	8965516	8975803	36.94	36.99	-0.2%

Sample # 1 N419
2 N272
3 N229

Conc. = concentration in ppmC, %RSD = % relative standard deviation,
RF = response factor = Average Area/Conc., IRF = response factor from initial calibration,
%Diff. = %(RF-IRF)/IRF for preanalysis/= %(RF(post)-RF(pre)/RF(pre), C2+ = propane

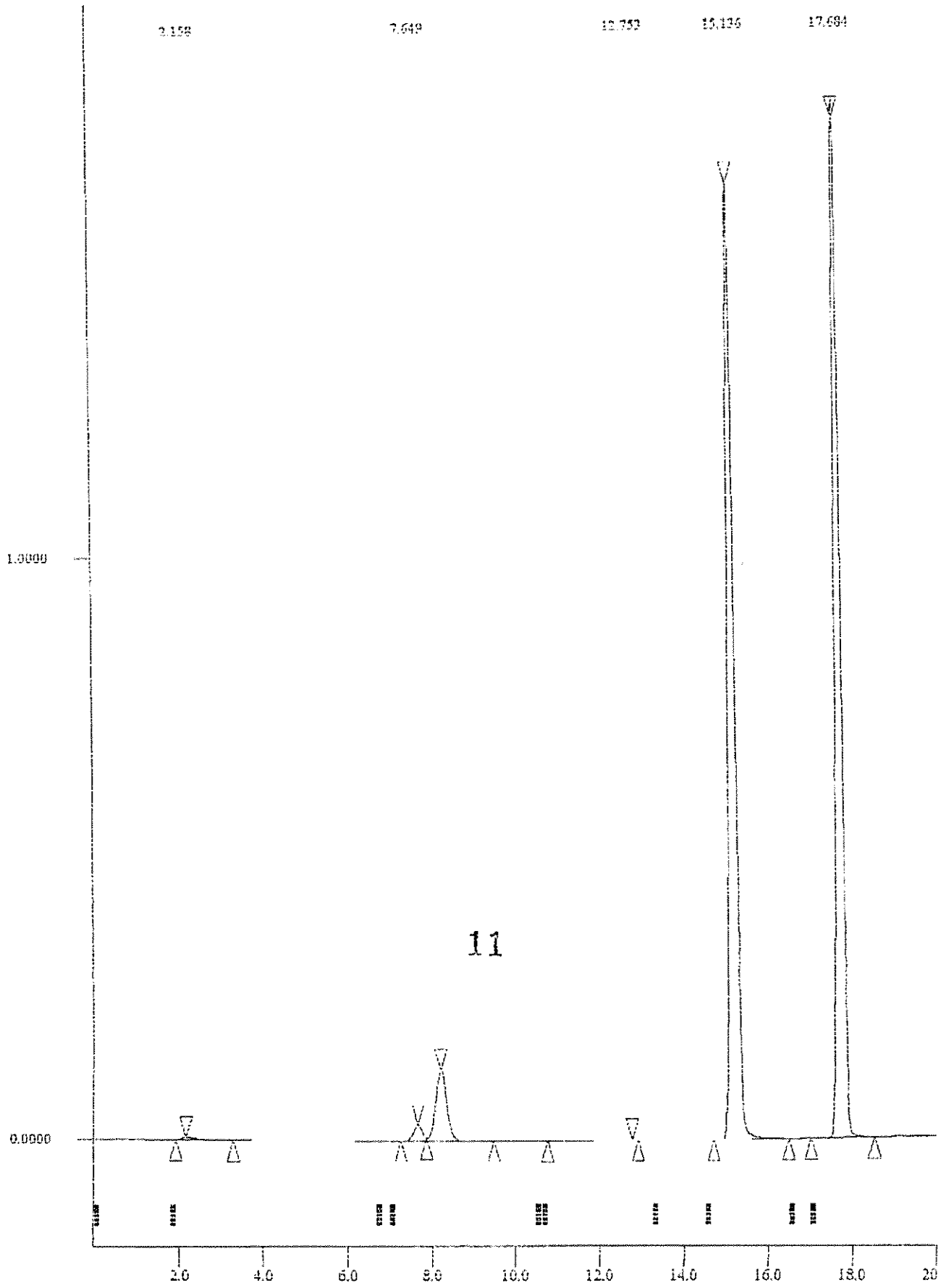

8.0000
6.0000
4.0000
2.0000
0.0000
7.577
15.183
16.246
17.579
19.034
09
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20

Print Date: Wed Jun 06 14:55:59 2007 Page 1 of 1

```
 itle        :
Run File     : C:\STAR\RECALCF\TES_F136.RUN
Method File  : C:\STAR\CALTCD.MTH
Sample ID    : 1- 3C MIX CC93314

Injection Date: 4-JUN-7 3:19 PM     Calculation Date: 4-JUN-7 3:39 PM

Operator    :                        Detector Type: ADCB (10 Volts)
Workstation: MS-DOS_6                Bus Address  : 16
Instrument : Varian Star #1          Sample Rate  : 10.00 Hz
Channel    : A = A                   Run Time     : 20.002 min

********** Star Chromatography Workstation ******* Version 4.5 ***************

Run Mode          : Analysis
Peak Measurement: Peak Area
Calculation Type: Percent
```

Peak No.	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)	Status Codes
1	O2	5.2971	7.577	-0.023	708287	BV	13.7	
2	N2	23.3854	8.055	-0.015	3126903	VB	18.5	
3	CH4	3.9606	15.183	-0.067	529583	BB	9.7	
4	CO2	67.3568	17.579	-0.021	9006391	BB	0.0	
	Totals:	99.9999		-0.126	13371164			

```
Total Unidentified Counts :          0 counts

Detected Peaks: 7          Rejected Peaks: 3      Identified Peaks: 4

Multiplier: 1          Divisor: 1

Baseline Offset: 25 microVolts

Noise (used): 30 microVolts - fixed value
Noise (monitored before this run): 80 microVolts

Could not format the injection information for this run.
Install the driver for the module at address 17 (type 8) to format this data.

Revision Log:

4-JUN-7 3:39 PM: Calculated results from channel A using method:
     'C:\STAR\CALTCD.MTH'

Error Log:

Could not format the error log for the module at address 17 (type 8).
Install the appropriate module driver to format this data.

ADC Board:

Original Notes:

********************************************************************************
```



Filename: C:\STAR\RECAL\CPVTE8_F139.RUN Channel: A = A

Print Date: Wed Jun 06 14:56:09 2007 Page 1 of 1

Title :
Run File : C:\STAR\RECALCF\TES_F139.RUN
Method File : C:\STAR\TCD.MTH
Sample ID : 2- tank N419

Injection Date: 4-JUN-7 4:46 PM Calculation Date: 4-JUN-7 5:06 PM

Operator :
Workstation: MS-DOS_6
Instrument : Varian Star #1
Channel : A = A

Detector Type: ADCB (10 Volts)
Bus Address : 16
Sample Rate : 10.00 Hz
Run Time : 20.002 min

********** Star Chromatography Workstation ******* Version 4.5 **********

Run Mode : Analysis
Peak Measurement: Peak Area
Calculation Type: Percent

Peak No.	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)	Status Codes
1	O2	1.0737	7.649	0.049	40777	BV	14.8	
2	N2	5.8176	8.192	0.122	220944	VB	17.2	
3	CH4	46.8817	15.136	-0.114	1780501	BB	10.1	
4	CO2	45.8889	17.684	0.084	1742793	BB	9.3	
	Totals:	99.6619		0.141	3785015			

Total Unidentified Counts : 12842 counts

etected Peaks: 6 Rejected Peaks: 0 Identified Peaks: 4

Multiplier: 1 Divisor: 1

Baseline Offset: -9 microVolts

Noise (used): 90 microVolts - monitored before this run

Could not format the injection information for this run.
Install the driver for the module at address 17 (type 8) to format this data.

Error Log:

Could not format the error log for the module at address 17 (type 8).
Install the appropriate module driver to format this data.

ADC Board:

****

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 3-C DATA REPORT

Name: BT Environmental ID#07140-25C Analyzed: 6/4/07

Project ID: Cornerstone 07-3600.00

Sample # 1 Flare Inlet Run 1

TANK N419:
Volume (cu.m) = 0.004477

	Pressure (mm Hg)	Temperature (K)	P/T
Presampling	325.0	297.15	1.094
Postsampling	585.0	301.15	1.943
Lab receipt	585.0	301.15	1.943
Final	1988.0	301.15	6.601
Barometric	748.0		
Water Vapor	28.3		

Field and laboratory postsampling pressure-temperature comparison:

Laboratory receipt P/T / Field postsampling P/T = 1.000

Volume Sampled (dscm) = 0.001466

Calibration Data:

	O2	N2	CH4	CO2
Response Factor (area units/ppmC)	28.72	31.37	25.77	36.99
Practical Quantitation Limit (ppm)	156	156	156	156

Areas:

O2	40,777	40,920	40,697
N2	220,944	221,700	221,125
CH4	1,780,501	1,780,736	1,779,515
CO2	1,742,793	1,744,494	1,744,560

Concentrations:

	ppm		
	Amount ±	SD	%RSD
O2	11482 ±	32	0.3
N2	57009 ±	102	0.2
CH4	558380 ±	203	0.0
CO2	381077 ±	219	0.1

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 3-C DATA REPORT

Name: BT Environmental ID#07140-25C Analyzed: 6/4/07

Project ID: Cornerstone 07-3600.00

Sample # 2 Flare Inlet Run 2

TANK N272:
Volume (cu.m) = 0.004540

	Pressure (mm Hg)	Temperature (K)	P/T
Presampling	326.0	297.15	1.097
Postsampling	600.0	301.15	1.992
Lab receipt	600.0	301.15	1.992
Final	1877.0	301.15	6.233
Barometric	748.0		
Water Vapor	28.3		

Field and laboratory postsampling pressure-temperature comparison:

Laboratory receipt P/T / Field postsampling P/T = 1.000

Volume Sampled (dscm) = 0.001568

Calibration Data:

	O2	N2	CH4	CO2
Response Factor (area units/ppmC)	28.72	31.37	25.77	36.99
Practical Quantitation Limit (ppm)	140	140	140	140

Areas:

O2	46,381	46,448	46,534
N2	251,163	250,785	251,219
CH4	1,981,391	1,978,434	1,978,260
CO2	1,941,303	1,938,610	1,941,340

Concentrations:

	ppm		
	Amount ±	SD	%RSD
O2	11704 ±	19	0.2
N2	57907 ±	54	0.1
CH4	555759 ±	494	0.1
CO2	379565 ±	306	0.1

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 3-C DATA REPORT

Name: BT Environmental ID#07140-25C Analyzed: 6/4/07

Project ID: Cornerstone 07-3600.00

Sample # 3 Flare Inlet Run 3

TANK N229:
Volume (cu.m) = 0.004477

	Pressure (mm Hg)	Temperature (K)	P/T
Presampling	325.0	297.15	1.094
Postsampling	592.0	301.15	1.966
Lab receipt	592.0	301.15	1.966
Final	1891.0	301.15	6.279
Barometric	748.0		
Water Vapor	28.3		

Field and laboratory postsampling pressure-temperature comparison:

Laboratory receipt P/T / Field postsampling P/T = 1.000

Volume Sampled (dscm) = 0.001506

Calibration Data:

	O2	N2	CH4	CO2
Response Factor (area units/ppmC)	28.72	31.37	25.77	36.99
Practical Quantitation Limit (ppm)	145	145	145	145

Areas:

O2	167,607	167,885	167,778
N2	717,015	718,623	718,935
CH4	1,614,451	1,617,569	1,605,055
CO2	1,590,133	1,588,794	1,576,452

Concentrations:

	ppm	
	Amount ± SD	%RSD
O2	43712 ± 37	0.1
N2	171329 ± 246	0.1
CH4	468223 ± 1892	0.4
CO2	320690 ± 1526	0.5

Chain of Custody

Triangle Environmental Services, Inc.

LABORATORY SAMPLE INFORMATION AND CHAIN-OF-CUSTODY FORM

Company Name: BTEC		Project/Client ID: Cornerstone AFE 07-36-0111	Date: 5-31-07
Contact Person: Mark Westerberg	Phone #: 734 323 9053	Process Type: Candlestick Flare	
Latest Date Complete Set of Samples Expected at Lab:	Note: Normal Turnaround is 15 working days after receipt of complete set of samples	Results Due Date: 6-22-07 Report Package Due Date:	Extra charge will apply for rush results

Send Report to: (Street address required for Fed Ex shipment of report)	*Person* Mark Westberg	Send Invoice to: (if different from report address)	*Person*
	Company BTEC		*Company*
	Address 2615 Wixom		*Address*
	Ferndale, MI 48220		
Phone # 248 548 8070	*FAX #* 248-548-8073		*PO#*

✓ all applicable boxes

Analysis

US EPA: ☐ Method 25 ☑ Method 3-C ☐ Method 25-C (NMOC as C [default]) ☐ Method 10-B SCAQMD: ☐ Method 25.1 ☐ Method 25.2

# of Tank & Trap Samples:	# of Tank-Only Samples: 3	# of Trap-Only Samples:	# of Bag Samples:
☐ Audit with Delay (*extra charge*)	☐ Rush Turnaround (*extra charge*)	☐ High Concentrations Possible ☐ Call if Concentrations High	☐ Dilute High Concentrations (*extra charge*)

Special Instructions:

Tanks for Analysis (Bags) (List IDs): N419, N272, N229

Traps for Analysis (List IDs):

☑ TES Equipment	☐ Client Equipment	☐ Client Equipment to be Reconditioned
Tanks, Unused for Reconditioning (List IDs): N321		Traps, Unused for Reconditioning (List IDs):

Relinquished by:		Date: 5-31-07	Time: 1330	To: (Carrier)			
Tanks received at TES by:	Condition: good	Date: 6/1/07	Time: 1130	Traps received at TES by:	Condition:	Date:	Time:

METHOD 25 SAMPLE DATA
Triangle Environmental Services, Inc.

Company Name:	BT Environmental		Date: 5/25/07
Units of Measure:	Pressure: ☑ mm Hg ☐ in.Hg		Temperature: ☐ °F ☑ °C
Sample #	Tank ID # N419		Trap ID #
Description (20 character limit)	FLARE INLET RUN 1		
Start time 10:16	Barometric Pressure	Tank Vacuum	Absolute Pressure	Temperature
Pre-Test Data	761	-50 (14.5)	325	24°
Post-Test Data		-14 (4.5)		
Sample #	Tank ID # N272		Trap ID #
Description (20 character limit)	FLARE INLET RUN 2		
Start time 10:48	Barometric Pressure	Tank Vacuum	Absolute Pressure	Temperature
Pre-Test Data	761	-52 (15.25)	326	24°
Post-Test Data		-13 (3.0)		
Sample #	Tank ID # N225		Trap ID #
Description (20 character limit)	FLARE INLET RUN 3		
Start time 11:23	Barometric Pressure	Tank Vacuum	Absolute Pressure	Temperature
Pre-Test Data	761	-50 (15)	325	24°
Post-Test Data		-15 (4)		
Sample #	Tank ID # N321		Trap ID #
Description (20 character limit)			
	Barometric Pressure	Tank Vacuum	Absolute Pressure	Temperature
Pre-Test Data	761		325	24°
Post-Test Data				
Sample #	Tank ID #		Trap ID #
Description (20 character limit)			
	Barometric Pressure	Tank Vacuum	Absolute Pressure	Temperature
Pre-Test Data				
Post-Test Data				
Sample #	Tank ID #		Trap ID #
Description (20 character limit)			
	Barometric Pressure	Tank Vacuum	Absolute Pressure	Temperature
Pre-Test Data				
Post-Test Data				

BTEC Inc.
USEPA METHOD 2 GAS VELOCITY TRAVERSE AND VOLUMETRIC FLOWRATE DATA SHEET

Client: Cornerstone
Date: 5/31/07
Sampling Location: Flare inlet
Stack Dimensions - Distance A:
Stack Dimensions - Distance B:
Stack Diameter: 14"
Stack Area, Sq ft.:
Gas Temp., °F WB: 80°
Gas Temp., °F DB:

Run Number: Flow 1
Time: 12:00
% CO2:
% O2:

Operators: BC/MW
Pitot Tube number: 5FT
Pitot Tube factor, Cp: .99
Cyclonic Flow Check:
Bar. Pressure in Hg.:
Static Pressure in H2O: +2.5
Moisture, v/v:
% CO:
% N2:

% of Stack Diameter	Point Distance (in.)	Traverse Point Number	Velocity Head (ΔP) in H2O	Stack Temp °F	√Vel. Head (ΔP) in H2O	Null Angle (zero ΔP angle)	Flow Angle Ø (90° from null angle)
		6	.14	106			
		5	.22	↓			
		4	.30				
		3	.38				
		2	.36				
		1	.32				

Company	Evergreen Recycling and Disposal Facility, Northwood, OH		
Source Designation	Flare Inlet		
Test Date	5/31/2007	**Pitot Tube Corr. Factor**	0.99
Test Number	1	**Moisture Content (%)**	3.0
Operator	MW/BC	**Condensate Volume**	- - - -
Barometric Pressure	29.25	**Silica Gel Weight Gain**	- - - -
Stack Static Pressure	2.3	**Gas Analysis Results:**	
Stack Dimensions (in.)	14	**CO_2**	38.1
Traverse points	6	**O_2**	1.1
Wet-bulb temp. (°F)	- - - -	**N_2**	5.7
Pitot Tube Number	1	**CH_4**	55.8

Traverse Point Number	Stack Temp. (°F)	Velocity Pres. ("H_2O)	Traverse Point Number	Stack Temp. (°F)	Velocity Pres. ("H_2O)
6	106.0	0.14	6	106.0	0.14
5	106.0	0.22	5	106.0	0.22
4	106.0	0.32	4	106.0	0.32
3	106.0	0.38	3	106.0	0.38
2	106.0	0.36	2	106.0	0.36
1	106.0	0.32	1	106.0	0.32
	106.0			106.0	

Stack Pressure (Ps "Hg)	29.42
Stack Gas Specific Gravity (Gs)	0.94
Average Stack Temperature (Ts °F)	212
Average Stack Velocity (Vs ft/minute)	2,265
Area of Stack (As ft^2)	1.07
Flowrate (Actual CFM)	2,421
Flowrate (Standard CFM)	2,221
Flowrate (Dry Standard CFM)	2,154

Company	Evergreen Recycling and Disposal Facility, Northwood, OH		
Source Designation	Flare Inlet		
Test Date	5/31/2007	**Pitot Tube Corr. Factor**	0.99
Test Number	2	**Moisture Content (%)**	3.0
Operator	MW/BC	**Condensate Volume**	- - - -
Barometric Pressure	29.25	**Silica Gel Weight Gain**	- - - -
Stack Static Pressure	2.3	**Gas Analysis Results:**	
Stack Dimensions (in.)	14	**CO_2**	38.0
Traverse points	6	**O_2**	1.2
Wet-bulb temp. (°F)	- - - -	**N_2**	5.8
Pitot Tube Number	1	**CH_4**	55.6

Traverse Point Number	Stack Temp. (°F)	Velocity Pres. ("H_2O)	Traverse Point Number	Stack Temp. (°F)	Velocity Pres. ("H_2O)
6	106.0	0.14	6	106.0	0.14
5	106.0	0.22	5	106.0	0.22
4	106.0	0.32	4	106.0	0.32
3	106.0	0.38	3	106.0	0.38
2	106.0	0.36	2	106.0	0.36
1	106.0	0.32	1	106.0	0.32
	106.0			106.0	

Stack Pressure (Ps "Hg)	29.42
Stack Gas Specific Gravity (Gs)	0.94
Average Stack Temperature (Ts °F)	212
Average Stack Velocity (Vs ft/minute)	2,266
Area of Stack (As ft^2)	1.07
Flowrate (Actual CFM)	2,422
Flowrate (Standard CFM)	2,222
Flowrate (Dry Standard CFM)	2,155

Company	Evergreen Recycling and Disposal Facility, Northwood, OH		
Source Designation	Flare Inlet		
Test Date	5/31/2007	**Pitot Tube Corr. Factor**	0.99
Test Number	3	**Moisture Content (%)**	3.0
Operator	MW/BC	**Condensate Volume**	- - - -
Barometric Pressure	29.25	**Silica Gel Weight Gain**	- - - -
Stack Static Pressure	2.3	**Gas Analysis Results:**	
Stack Dimensions (in.)	14	**CO_2**	32.1
Traverse points	6	**O_2**	4.4
Wet-bulb temp. (°F)	- - - -	**N_2**	17.1
Pitot Tube Number	1	**CH_4**	46.8

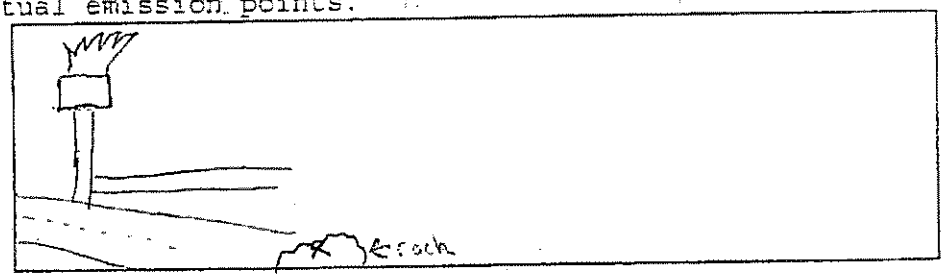
Traverse Point Number	Stack Temp. (°F)	Velocity Pres. ("H_2O)	Traverse Point Number	Stack Temp. (°F)	Velocity Pres. ("H_2O)
6	106.0	0.14	6	106.0	0.14
5	106.0	0.22	5	106.0	0.22
4	106.0	0.32	4	106.0	0.32
3	106.0	0.38	3	106.0	0.38
2	106.0	0.36	2	106.0	0.36
1	106.0	0.32	1	106.0	0.32
	106.0			106.0	

Stack Pressure (Ps "Hg)	29.42
Stack Gas Specific Gravity (Gs)	0.95
Average Stack Temperature (Ts °F)	212
Average Stack Velocity (Vs ft/minute)	2,258
Area of Stack (As ft^2)	1.07
Flowrate (Actual CFM)	2,414
Flowrate (Standard CFM)	2,214
Flowrate (Dry Standard CFM)	2,148

FUGITIVE OR SMOKE EMISSION INSPECTION
OUTDOOR LOCATION

Company Cornerstone Location Evergreen Recycling and Disposal Facility Company Rep.	Observer BC Affiliation BIEC Date 5-31-07
Sky Conditions Clear and Sunny Precipitation None	Wind Direction NA Wind Speed 0
Industry	Process Unit

Sketch process unit: indicate observer position relative to source; indicate potential emission points and/or actual emission points.



OBSERVATIONS	Clock Time	Observation period duration, min:sec	Accumulated emission time, min:sec
Begin Observation	10:00		
End Observation	12:00		

Figure 22-1

SAMPLE CALCULATIONS

Stack Gas Velocity

Absolute Stack Gas Temperature, T_s (°R)

$$T_s = 460 + t_s$$

Where: t_s = Measured stack gas temperature (°F)

For example, for the first flow measurement performed on the flare stack, the average stack temperature was 106°F. The average temperature in degrees Rankine is therefore 106 + 460 = 566°R.

Absolute Stack Gas Pressure, P_s (in. Hg)

$$P_s = P_{bar} + \left(\frac{P_{stat}}{13.6}\right)$$

Where: P_{bar} = Barometric pressure at test site (in. Hg)
P_{stat} = Stack static pressure (in. Hg)

For example, for the first flow measurement performed on the flare stack, the barometric and stack static pressures were 30.11"Hg, and 2.5"H_2O, respectively. The absolute stack pressure is then:

$$P_s = 30.11 + \left(\frac{2.5}{13.6}\right) = 30.29" Hg$$

Stack Gas Molecular Weight, Dry Basis (lb/lb mole)

$$M_d = 0.44(\%CO_2) + 0.32(\%O_2) + 0.28(\%N_2 + \%CO) + 0.16(\%CH_4)$$

For example, the O_2 content of the flare inlet gas stream was 1.1%. The CO_2 content of the gas stream was 38.1%, and the N_2 content was 5.7%. The methane content was 55.8%[1]. The dry stack gas molecular weight is therefore:

$$M_d = 0.44(38.1\%) + 0.32(1.1\%) + 0.28(5.7\%) + 0.16(55.8\%) = 27.64 \frac{\text{lb}}{\text{lb mol}}$$

Stack Gas Molecular Weight, Wet Basis (lb/lb mole)

$$M_s = M_d\left(1-\frac{B_{ws}}{100}\right)+18\left(\frac{B_{ws}}{100}\right)$$

The stack gas moisture content from the USEPA Method 3C analysis was 3.8%. The wet stack gas molecular weight is then:

$$M_s = 27.64\frac{\text{lb}}{\text{lb mol}}(1-0.038)+18(0.038) = 27.27\frac{\text{lb}}{\text{lb mol}}$$

Stack Gas Exit Velocity, V_s (fps)

$$V_s = K_p C_p\sqrt{\frac{\Delta P T_s}{P_s M_s}}$$

Where: K_p = Pitot tube constant equal to $85.49\ \frac{ft}{\text{sec}}\sqrt{\frac{(lb/lb\cdot mole)(in.Hg)}{(^{\circ}R)(in.H_2O)}}$

C_p = Pitot tube coefficient, dimensionless

ΔP = Velocity head of stack gas (in. H_2O)

M_s = Molecular weight of the stack gas, wet basis (lb/lb mole)

For example, for the first flow measurement performed on the flare stack the average velocity head of the stack gas was 0.29"H_2O. The diameter of the inlet duct where flow measurements were made is 14". Using values already calculated, the average stack gas velocity at the point of measurement was calculated as follows:

$$V_s = \left(85.49\frac{ft}{\text{sec}}\sqrt{\frac{(\text{lb/lb mol})(in.Hg)}{(^{\circ}R)(in.H_2O)}}\right)(0.99)\sqrt{\frac{(0.29in.H_2O)(566^{\circ}R)}{(30.29in.Hg)\left(27.64\frac{\text{lb}}{\text{lb mol}}\right)}} = 37.3\frac{ft}{\text{sec}}$$

The cross-sectional area of the inlet duct at the point of measurement is:

$$\frac{\pi}{4}\left(\frac{14\,in}{12\frac{in}{ft}}\right)^2 = 1.07\,ft^2$$

The stack gas volumetric flowrate is then:

$$\left(1.07\,ft^2\right)\left(37.3\frac{ft}{\text{sec}}\right) = 39.9\frac{ft^3}{\text{sec}}$$

The flare tip inner diameter is 14". The cross-sectional area of the flare tip is then:

$$\frac{\pi}{4}\left(\frac{14in}{12\frac{in}{ft}}\right)^2 = 1.07\,ft^2$$

The flare gas exit velocity is then:

$$\frac{39.9\frac{ft^3}{\text{sec}}}{1.07\,ft^2} = 37.3\frac{ft}{\text{sec}}$$

Stack Gas Net Heating Value

$$H_T = K\sum_{i=1}^{n} C_i H_i$$

Where: H_T = net heating value of the sample (MJ/scm)

$$K = 1.740 \cdot 10^{-7}\left(\frac{1}{ppm}\right)\left(\frac{gmole}{scm}\right)\left(\frac{MJ}{kcal}\right)$$

C_i = concentration of component i on a wet basis (ppm)
H_i = net heat of combustion of sample component i (kcal/g mole at 25°C and 760 mm Hg)

For example, the first USEPA Method 3C sample taken was 558,380 ppm methane. The heating value for methane in the USEPA Office of Air Quality Planning and Standards' Control Cost Manual is 11.9533 kcal/g. The molecular weight of methane is 16 g/g mole. The net heat of combustion of methane is then:

$$11.9533\frac{kcal}{g}\left(16\frac{g}{g\ mole}\right) = 191.25\frac{kcal}{g\ mole}$$

The net heating value of the sample gas stream is then:

$$H_T = 1.740 \cdot 10^{-7}\left[\left(\frac{1}{ppm}\right)\left(\frac{g\ mole}{scm}\right)\left(\frac{MJ}{kcal}\right)\right](558{,}380\,ppm)\left(191.25\frac{kcal}{g\ mole}\right) = 18.58\frac{MJ}{scm}$$